

**Angler effort index for the Alagnak River, Alaska,
2000**

Final Report for Study 00-033

USFWS Office of Subsistence Management

Fishery Information Services Division

by

Craig N. Collins

and

Jason E. Dye

September 2005

Alaska Department of Fish and Game

Division of Sport Fish



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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H _A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km	east	E	confidence interval	C.I.
liter	L	north	N	correlation coefficient	R (multiple)
meter	m	south	S	correlation coefficient	r (simple)
metric ton	mt	west	W	covariance	cov
milliliter	ml	Copyright	©	degree (angular or temperature)	°
millimeter	mm	Corporate suffixes:		degrees of freedom	df
Weights and measures (English)		Company	Co.	divided by	÷ or / (in equations)
cubic feet per second	ft ³ /s	Corporation	Corp.	equals	=
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	fork length	FL
inch	in	et alii (and other people)	et al.	greater than	>
mile	mi	et cetera (and so forth)	etc.	greater than or equal to	≥
ounce	oz	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
pound	lb	id est (that is)	i.e.,	less than	<
quart	qt	latitude or longitude	lat. or long.	less than or equal to	≤
yard	yd	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
Spell out acre and ton.		months (tables and figures): first three letters	Jan,...,Dec	logarithm (base 10)	log
Time and temperature		number (before a number)	# (e.g., #10)	logarithm (specify base)	log ₂ , etc.
day	d	pounds (after a number)	# (e.g., 10#)	mideye-to-fork	MEF
degrees Celsius	°C	registered trademark	®	minute (angular)	'
degrees Fahrenheit	°F	trademark	™	multiplied by	x
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	not significant	NS
minute	min	United States of America (noun)	USA	null hypothesis	H ₀
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
Spell out year, month, and week.				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY MANUSCRIPT NO. 05-XX

ANGLER EFFORT INDEX FOR THE ALAGNAK RIVER, ALASKA, 2000

By

Craig N. Collins
and
Jason E. Dye

Division of Sport Fish, Dillingham

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

September 2005

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Craig N. Collins and Jason E. Dye
Alaska Department of Fish and Game, Division of Sport Fish
P.O. Box 230, Dillingham, AK 99576-0230, USA

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Final Report Summary Page

Title: Angler effort index for the Alagnak River, Alaska, 2000

Study Number: FIS01-33

Investigator(s)/Affiliation(s): Craig N. Collins and Jason E. Dye, Alaska Department of Fish and Game, Division of Sport Fish

Geographic Area: Bristol Bay

Information Type: Harvest monitoring (index)

Issue(s) Addressed: Sport harvest generally does not contribute substantially to total harvest in sockeye salmon runs in Bristol Bay. However, sport harvest on Chinook and coho salmon in Bristol Bay may constitute a substantial portion of overall harvest on those species. The Alaska Department of Fish and Game (ADFG) conducts a statewide harvest mail in survey, which is used to estimate total harvest in large drainages such as the Alagnak River. Cyclical creel surveys to obtain biological samples and more focused sampling of a subsection of the river are also conducted. Information that is currently lacking in these efforts is an indication of how angler effort is partitioned in space and time throughout the river. This information would assist managers in design and interpretation of focused creel surveys for subsections of the river, and potentially improve our ability to understand how the Chinook and coho fisheries are distributed throughout the drainage.

Study Cost: \$41,700 (contract with ADFG was \$9,500)

Study Duration: June 2000 to August 2000

Abstract: An angler effort survey was conducted on the Alagnak River from 10 June – 10 August 2000. This was a collaborative effort between the Alaska Department of Fish and Game (ADFG) – Division of Sport Fish, the National Park Service (NPS), and the Bristol Bay Native Association (BBNA). ADFG provided detailed data collection instructions and technical review of the project design. Several problems were encountered during the project and it was not completed as scheduled. However, the data collected indicated that there is heavier use of the lower river than the upper river and peak use occurs during July. Rafts were most common in the upper river and decreased in frequency with each downstream segment. Overall use was dominated by the salmon fishery in the tidal section. These data were subsequently used by ADFG to help design a more comprehensive Alagnak River Chinook and coho salmon creel survey conducted during 2001 and 2002.

Key Words: Bristol Bay, Alaska Peninsula, Kodiak, Bristol Bay area, Naknek/Kvichak district, Alagnak River, salmon, trout, adult, harvest monitoring, angler effort index.

Project Data: ADFG did not collect nor archived the data for this project. Data should be available from National Park Service.

Citation: Collins, C. N. and J. E. Dye. 2005. Angler effort index for the Alagnak River, Alaska, 2000. USFWS Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report No. FIS01-33, Anchorage, Alaska.

ABSTRACT

An angler effort survey was conducted on the Alagnak River from 10 June – 10 August, 2000. This was a collaborative effort between the Alaska Department of Fish and Game – Division of Sport Fish (ADF&G), the National Park Service (NPS), and the Bristol Bay Native Association (BBNA). ADF&G provided detailed data collection instructions and technical review of the project design. Several problems were encountered during the project and it was not completed as scheduled. However, the data collected indicated that during the study year there was heavier use of the lower river than the upper river and peak use occurred during July. Rafts were most common in the upper river and decreased in frequency with each downstream segment. Overall use was dominated by the salmon fishery in the tidal section. These data were subsequently used by ADF&G to help design a more comprehensive Alagnak River Chinook and coho salmon creel survey conducted during 2001 and 2002.

Key words: Bristol Bay, Alaska Peninsula, Kodiak, Bristol Bay area, Naknek/Kvichak district, Alagnak River, salmon, trout, adult, harvest monitoring, angler effort index.

INTRODUCTION

The Alagnak River, known locally as the Branch River, is located in the Kvichak River drainage approximately 60 km (40 miles) north of the community of King Salmon, Alaska (Figure 1). The Alagnak River hosts significant recreational fisheries for Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), rainbow trout (*O. mykiss*), and several other species. Anglers typically access the river from various lodges located on the river, and by floatplanes from King Salmon or other lodge sites within the area.

Annual sport fishing effort, first estimated with the Statewide Harvest Survey (SWHS) for 1981, was variable during the 1980's. Effort increased substantially in the late 1980s and early 1990s, but decreased during the mid and late 1990s (Mills 1982-1994; Howe et al. 1995-1996, 2000a-d). Since 1991, angler effort has averaged 8,673 angler days (Mills 1993, 1994; Howe et al. 1995-1996, 2001a-d).

In response to the increased sport fishing effort at the Alagnak River during the early 1990s, the Alaska Board of Fisheries (BOF) reduced the daily bag limit of Chinook salmon from three fish, of which two could exceed 28 inches in length, to three fish, of which one could exceed 28 inches in length. In addition, the BOF established a Bristol Bay annual bag limit of five Chinook salmon as well as a spawning season closure of 31 July (ADFG 1998). Guides were also prohibited from retaining fish while guiding. At the same time, the coho salmon daily bag limit was reduced from five fish per day to three fish per day.

In addition to the SWHS, there have been several onsite surveys of the Alagnak Chinook and coho salmon fisheries. These surveys were conducted to gather fishery information not available from the SWHS. The Chinook salmon fishery was first surveyed onsite in 1988 (Brookover 1989) and then again in 1989 (Dunaway 1990). In 1993, an onsite fisheries study addressed both the Chinook and coho salmon fisheries, and for the first time assessed angler success and harvest practices, as well as collected more detailed information on angler demographics and gear preferences (Dunaway 1994). Due to limited funds in 1998, the Alaska Department of Fish and Game – Division of Sport Fish (ADFG) was only able to study the Chinook salmon fishery. In the 1998 study, angler effort was indexed, catch and harvest rates were estimated, angler demographics and tackle selection were characterized, and biological samples were collected from the sport harvest (Naughton and Gryska 2000).

At one time, sport fisheries for Alagnak River salmon occurred primarily in the lower 12 miles of the river, but with increasing effort it expanded to include the lower 25 miles of the river. The potential impacts to Chinook and coho salmon stocks by the expanding sport fishery in the lower reaches of the Alagnak River have been a source of concern to resource managers, local residents and members of the sport fishing industry for some time. The concerns were especially apparent during the limited design and scope of the 1998 survey.

In Bristol Bay Native Association's (BBNA) spring 2000 information needs assessment project (BBNA 2000), Levelock and nearby villages identified concerns for the Alagnak River, including the need for assessing harvest of freshwater fish, need for a creel survey of the sport fishery, and need for assessment of salmon escapements. The National Park Service (NPS) has expressed similar concerns because the river uplands are designated as Wild and Scenic under NPS jurisdiction.

ADFG – Division of Sport Fish shares these concerns, especially given that the 1999 and 2000 spawning escapements for the Alagnak River were half the long term average (Sands et al. 2001). However, the fishery has expanded to more of the river than the ADFG can afford to monitor with designs of previous studies. During the summer of 2000, this project indexing angler effort was funded by the U.S. Fish and Wildlife Service, Office of Subsistence Management (OSM), and conducted jointly by the Katmai National Park (NPS) and the BBNA. Preliminary data from the effort index was used in part to develop a comprehensive two-year creel survey project on the Alagnak River funded by OSM.

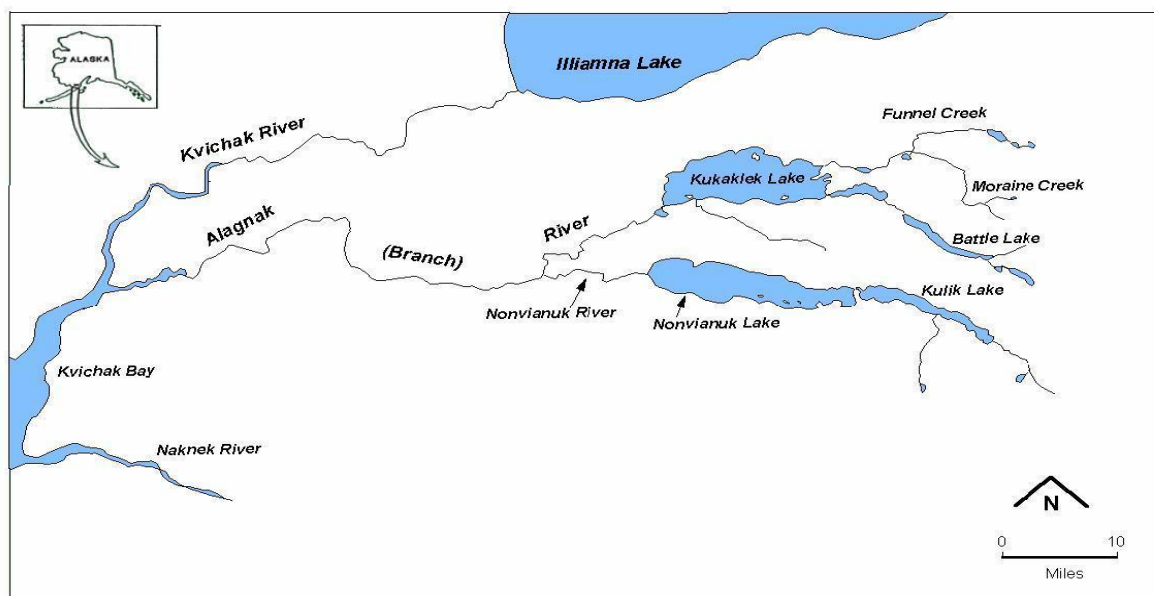


Figure 1.-The Alagnak River drainage in the Southwest Alaska Management Area.

OBJECTIVES

Objectives for the 2000 survey were to:

1. Count anglers and boats within designated river subsections throughout the summer.
2. Describe distribution of angler effort within the study site and over the time period of the study.

METHODS

STUDY AREA

The survey area extended from the mouth of the Alagnak River upstream to the confluence of the Kukaklek and Nonvianuk rivers. The Alagnak River was divided into four recognizable and functional subsections by consulting with the Water Resources Division and the Biological Resources Division of the U.S. Geological Survey, who have ongoing projects on the river.

The Alagnak River was divided into four subsections as follows: tidal, lower, middle, and upper. Descriptions of the subsections are listed below, with distances measured from the mouth and traveling in the upstream direction:

- Tidal - 0 to 20.5 km (Alagnak River mouth to Upper Barge)
- Lower - 20.5 to 55.5 km (Upper Barge to Katmai Lodge)
- Middle (Braids) - 55.5 to 67.5 km (Katmai Lodge to Charlie Andrews' cabin)
- Upper - 67.5 to 89.8 km (Charlie Andrews' cabin to the confluence)

The four subsections within the river allowed for use patterns to be characterized throughout the river.

DATA COLLECTION

The original sampling schedule went from 6 June through 14 September and sampling was scheduled every two days throughout those dates. Detailed field methodology is described in Dunaway (unpublished). A summary of the field methodology follows:

Two angler counts within the entire Alagnak River were to be conducted during each sampling day. One count was to be the count of record, and the second a non-record count was conducted to obtain information about variability within the counts. Angler counts between days were alternated between an upstream and a downstream pass through the fishery. The angler counts obtained during the non-record count were less rigorous, as the crew had the flexibility of stopping during a count to handle trespass issues with native allotments. The counts cannot be used to estimate angler effort for the fishery since all possible count times were not surveyed. If the distribution of angler effort throughout the sampling day does not vary during the course of the survey, then the counts obtained by this design will represent a relatively unbiased index of the angler effort during the days sampled (i.e., larger count = more angler effort). Conversely, if the within-day distribution of angler effort varies during the course of the survey (for example if anglers shift from morning to evening fishing), then the angler count will not be an unbiased index of the angler effort.

Angler counts of record were to take a maximum of 4 hours from beginning to end and were to commence exactly at the time scheduled. They were considered instantaneous and represent angler effort at the time the count was conducted. The starting time for the count of record was 10:00 am. Once at the starting point, the survey technicians were to count all apparent anglers while driving the boat at a constant rate of speed through the fishery to the far boundary of the study area. Apparent anglers means people who are handling or using fishing rods and tackle; including people who may have temporarily interrupted their fishing to reposition their boat, land a fish, repair their gear (tie on a new lure, fix a tangle, etc.) or assist another person with their fishing activities or eat lunch. An apparent angler does not include a boat operator who does not operate fishing gear, or a person who is engaged in some other activity not associated with angling. Count start and stop times and angler and boat counts were to be recorded for each of the four river subsections. Missed counts were documented and a brief explanation for the missed count was recorded (date, time, river subsections).

The crew leader was to maintain a daily log and report both the count of record and the non-record count to the NPS project supervisor via telephone immediately after returning to the Village of Levelock.

The Village of Levelock routinely patrols the river throughout the summer, primarily to handle trespass issues with native allotments. Those river patrols were refined, allowing the opportunity to collect sport angler data throughout the entire river corridor. Two residents of Levelock Village were to travel either up or down the Alagnak River every other day by jet boat to or from the confluence of the Kukaklek and the Nonvianuk rivers. For each group encountered they were to record the date, time, location, whether the group is associated with motorized or non-motorized boats, and the number of anglers within the group.

Data was provided to BBNA, NPS and ADFG during the study, and summarized and analyzed during the winter by NPS. The analysis focused on patterns of seasonal distribution of angler effort in the different reaches of the river. The data were also used to help design a more comprehensive creel survey that was conducted during the 2001 and 2002 Alagnak River Chinook and coho salmon fisheries.

DATA ANALYSIS

The daily angler counts conducted represent an index of angler effort, expressed as angler-days (one angler fishing for any amount of time during a day). Only a summary of the daily counts by study area and subsection was performed. Relative effort among subsections and study areas was compared.

RESULTS

A limited amount of effort data was collected (Figure 2). The spatial and temporal distribution of effort was not well characterized in this study, but the data reported indicates heavier use of the lower river than the upper river with peak use during July. Rafts were most common in the upper river and decreased in frequency with each downstream segment. Overall use was dominated by the salmon fishery in the tidal section. Overall use was relatively similar among the other three sections. This information was useful in helping to design the sampling schedule

and sampling locations for a more comprehensive Alagnak River salmon creel survey conducted by ADFG and funded by OSM during 2001 and 2002.

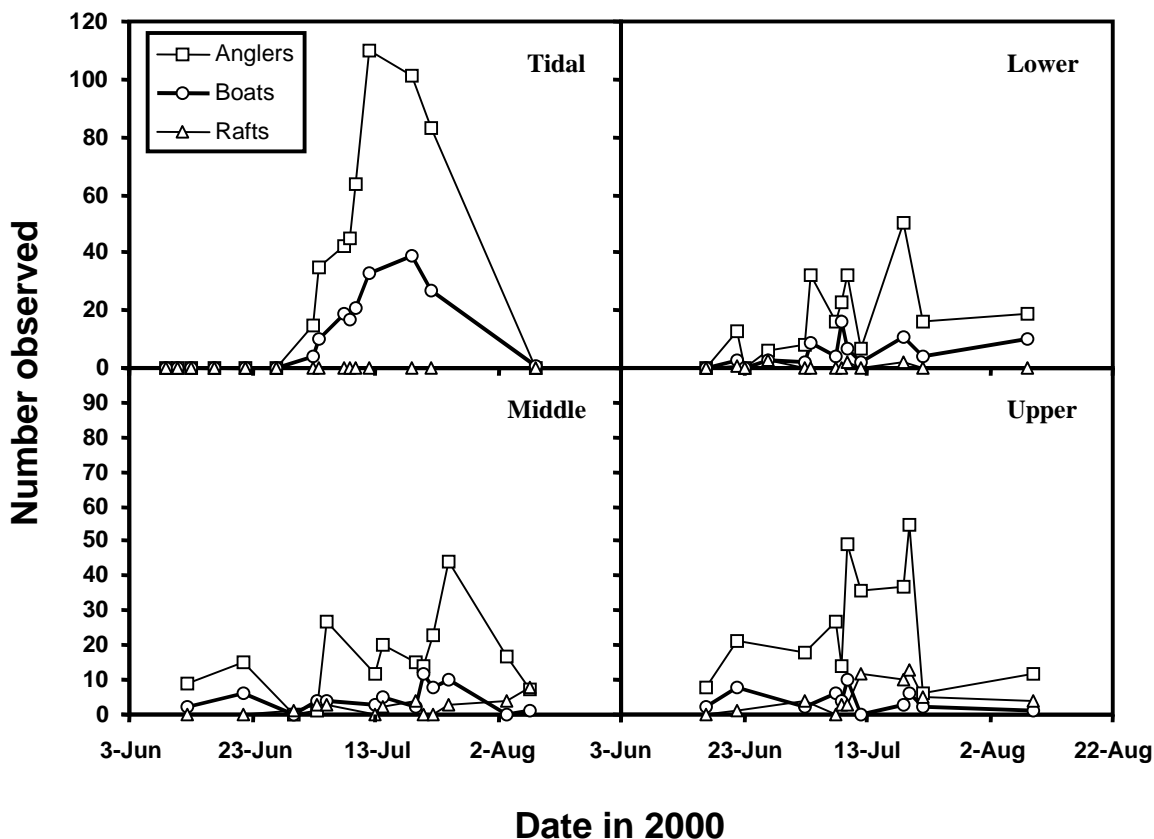


Figure 2.-Angler, boat, and raft counts for the Alagnak River in summer 2000.

DISCUSSION

Despite a technically sound study design, several problems were encountered during the 2000 Alagnak River angler effort index survey; therefore, it was not completed as originally scheduled. The original schedule was to conduct counts every other day from June 10 through September 15. The dates that were actually sampled were confined to June 10 through August 10. Scheduling problems included three primary sources: mechanical problems, conflicting missions, and budgetary confusion. Mechanical trouble with boat motors greatly limited the ability of the crew to accomplish counts for extended periods of time in June and July. Later, the crew was divided and partially diverted to Kvichak patrols, during which time it is unclear whether any Alagnak counts were conducted. The budgetary situation exacerbated the problem. The project funding contracted to ADFG arrived too late to help plan this index project, and instead was used to begin planning of a subsequent creel survey on Alagnak River salmon fisheries. Future projects should include timelier budget allocations.

There was also difficulty getting technicians to record data as it was observed. During one sampling event, a NPS observer went along with the technicians to record data simultaneously with the technicians. The recorded data from the NPS observer were somewhat different from

that of the technicians in counts of anglers and boats (Figure 3). Rafts (Figure 3), which were low in number, and time of day (Figure 4) were relatively consistent between the observer and the technicians. To make sure that there was opportunity to properly record data, smaller, more usable versions of data sheets as well as tally counters were delivered to the technicians, though few counts were received subsequent to those actions. Because ADFG did not supervise the technicians, it is not clear whether the sheets or counters were used in the field after being distributed.

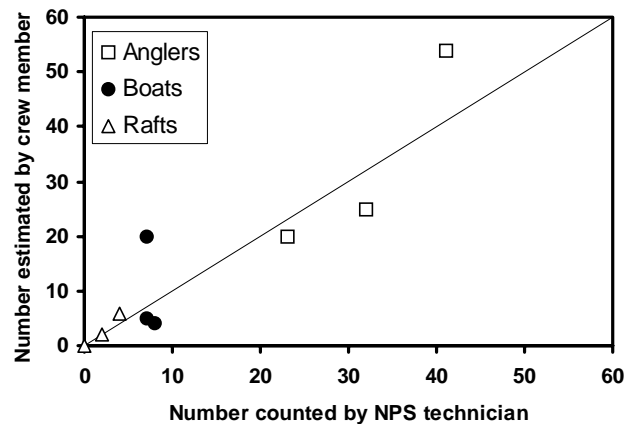


Figure 3.-Simultaneous counts of anglers, boats, and rafts by a NPS technician and a Levelock Village crew member. The technician used a tally counter and recorded data promptly at the end of each river section. The crew member counted without mechanical assistance and recorded the data after the entire survey was completed (hence the term “estimated” on the graph).

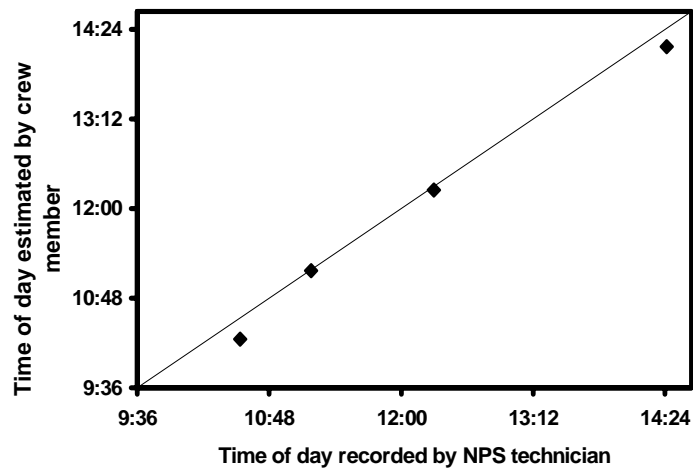


Figure 4.-Time of day recorded by NPS technician at the end of each river section and by Levelock Village crew member who recorded data at the end of the survey.

ADFG provided detailed written instructions for conducting the effort index counts; however, due to extenuating circumstances described below, the field technicians were under-trained and under-supervised during the field portion of the project. Training was originally set up for a full day of counts with two NPS employees and the Levelock Village technicians, with one NPS employee to remain in the field with the crew for the first week. The technicians, however, experienced motor trouble and arrived only in time to receive verbal instructions and instruction and data sheets, but had to leave at that point to get the motor repaired. Due to the length of time needed for repairs, the scheduled on-site training was never accomplished. This led to some poor data collection habits before the NPS staff could again team up with the technicians in the field.

RECOMMENDATIONS

Future collaborative projects of this type should include on-the-job training as originally intended with this project, and full-time on-site supervision, which was not part of the planning for this project. After a demonstration of their commitment to the project and a couple seasons of data collection, staff would be more prepared to operate on their own with an understanding of the methods and rigor necessary for appropriate data collection.

ACKNOWLEDGEMENTS

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